Trend Study 18A-31-07

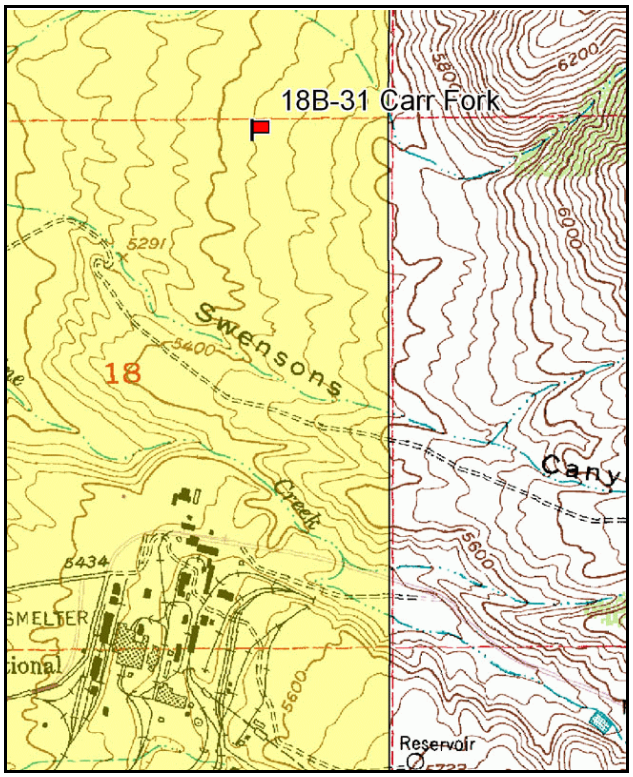
Study site name: Carr Fork . Vegetation type: Annual Grass-Forb .

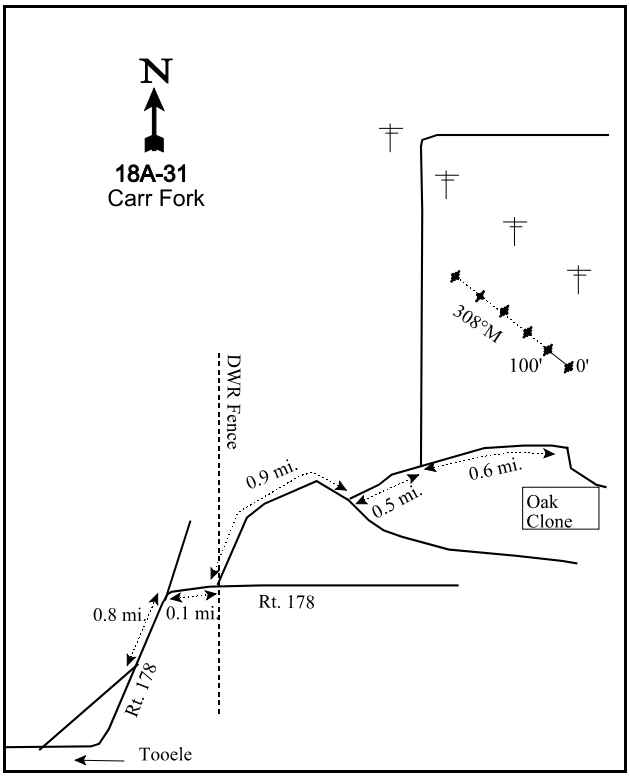
Compass bearing: frequency baseline 308 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

Go east on 4th north (Smelter Road) in Tooele for 1.5 miles to Ericson Road. Turn left, continue 0.8 miles to a fork in the road. Take the right fork for 0.1 miles to a locked gate (division lock). Stay on "old" road for 0.9 miles past a gate on the right. Go another 0.4 miles to a gate. Go 0.1 miles through a field of curly gum weed to a left fork. Take the left fork for 0.6 miles to a lone oak clone on the right. The 0-foot stake is on the left side of the road just before the power lines. The study is marked by green, steel fenceposts 12-18 inches in height. Roads were washed out in 2002 requiring walking about ½ mile to the site.





Map name: Bingham Canyon

Diagrammatic Sketch

Township 3S , Range 3W , Section 7

GPS: NAD 83, UTM 12T 396500 E 4491254 N

DISCUSSION

Carr Fork - Trend Study No. 18A-31

Study Information

This study was established in 1997 by request of the habitat manager in the Central Region. It lies on property that originally belonged to Anaconda Mining Company and was transferred to the Division of Wildlife Resources in 1994 [elevation: 5,400 feet (1,646 m), slope: 8%, aspect: west]. The site is an old tailings area for a copper mine, and was mostly composed of weeds. In the fall of 1986 and spring of 1987, the area was disked deeply twice and drill seeded with a mixture of grasses and forbs. The study was set up to monitor the results of the treatment. Deer use has been light. From the pellet group transect data, deer use was estimated at 36 deer days use/acre (89 ddu/ha) in 1997, 24 days use/acre (60 ddu/ha) in 2002, and 51 days use/acre (126 ddu/ha) in 2007. Use occurred during the fall and spring in 1997, and during the winter in 2002 and 2007. The nearby drainages provide good cover, mainly composed of Gambel oak (*Quercus gambelii*).

Soil

The soil is classified within the Kapod series (USDA-NRCS 2007). The soils in this series are stony loam and are derived from sandstone and limestone. They are deep and well-drained. The soil contains graded tailings from the Anaconda copper mines. Most sites containing tailings have mildly acidic soils, but this site is strongly acidic, with a pH of 5.5. The low pH may be one of the reasons that the seeding was not successful. The soil phosphorus is high at 51 ppm (Tiedemann and Lopez 2004). Relative bare ground cover was high in 1997 at 38%, but decreased to 5% and 4% in 2002 and 2007, respectively. Combined relative vegetation and litter cover increased from 60% in 1997 to approximately 90% in 2002 and 2007. The erosion condition class was determined as stable in 2002 and 2007.

Browse

The browse component is lacking with no browse species sampled in 1997. There was a small oak clone nearby, but it was not within the sample area. In 2002, a few transplanted bitterbrush (*Purshia tridentata*) plants were sampled at 80 plants/acre (198 plants/ha). Density increased slightly to 100 plants/acre (247 plants/ha) by 2007. These plants were all mature and vigorous. Annual leader growth averaged 3.4 inches (8.7 cm) in 2002 and 10 inches (25.3 cm) in 2007. There were also white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*) plants sampled within the height-crown measurements in 2007.

Herbaceous Understory

The seeded grass and forb species did not establish well. In 1997, the only seeded species sampled were small burnet (*Sanguisorba minor*) and Lewis flax (*Linum lewisii*). The remaining species sampled were weeds. Cheatgrass (*Bromus tectorum*), bulbous bluegrass, ragweed (*Ambrosia psilostachya*), whitetop (*Cardaria draba*), bindweed (*Convolvulus arvensis*), curlycup gumweed (*Grindelia squarrosa*), and dalmatian toadflax (*Linaria dalmatica*) made up almost 70% of the herbaceous cover in 1997. By 2007, the site was still dominated by bulbous bluegrass and weedy forbs. Bulbous bluegrass increased significantly in nested frequency between 1997 and 2002, with a cover increase from 6% to 26%. By 2007, this species decreased to 16% cover. It accounted for 72% of the total grass cover and 27% of the total herbaceous cover in 2007. Intermediate wheatgrass (*Agropyron intermedium*), which was seeded, was sampled beginning in 2002 at 3% cover. It increased to 6% cover in 2007, comprising 26% of the total grass cover.

Total forb cover was high, and it increased from 30% in 1997 to 37% in 2007. However, the forb composition has been poor and dominated by weeds. Weedy forbs included toadflax, ragweed, bindweed, gumweed, spreading dogbane (*Apocynum cannabinum*), and sunflower (*Helianthus annuus*). Of these species, toadflax was the most abundant. Three noxious weeds, whitetop, bindweed, and toadflax, accounted for half of the forb cover in 1997 and increased to 63% in 2002. In 2007, no whitetop was sampled and noxious weeds decreased to 44% of the total forb cover. Seeded forb species, such as small burnet and common sainfoin (*Onobrychis*

viciaefolia), remained in trace amounts. This treatment was not very successful. The area should be retreated in the future and seeded with species that are better adapted to acidic soils.

2002 TREND ASSESSMENT

The trend for browse is slightly up. A few seeded bitterbrush plants were sampled. Density was low at only 80 plants/acre (198 plants/ha). The plants were all mature and moderately to heavily hedged, but maintained good vigor. The trend for grass is stable. There were some improvements in the grass component. Seeded intermediate wheatgrass was sampled, along with a few other perennial species. However, the grass composition was still poor. Cheatgrass and bulbous bluegrass were dominant, and the latter species increased in nested frequency. Together, these species provided 88% of the total grass cover. Bulbous bluegrass is a poor value perennial, and is similar to cheatgrass in phenology and ecological value (Stewart and Hull 1949). It dries out early in the season and provides intense competition. The trend for forbs is slightly down. Composition was poor and was dominated by weeds. Weedy species accounted for 77% of the total forb cover in 1997, and increased to 97% in 2002. The combined cover of the three noxious weeds, whitetop, bindweed, and dalmatian toadflax, increased from 15% to 20%. Whitetop declined significantly in nested frequency while dalmatian toadflax increased significantly. The Desirable Components Index (DCI) in 1997 was rated as very poor due to the lack of browse, the grass composition of bulbous bluegrass and cheatgrass, and the presence of noxious weeds. In 2002, the DCI score improved slightly to very poor-poor, due to the introduction of browse and a small increase in perennial grass cover, excluding bulbous bluegrass.

1997 winter range condition (DCI) - very poor (2) Low potential scale
2002 winter range condition (DCI) - very poor-poor (11) Low potential scale
browse - slightly up (+1) grass - stable (0) forb - slightly down (-1)

2007 TREND ASSESSMENT

The trend for browse is stable. Bitterbrush, the only browse species, slightly increased in density to 100 plants/acre (247 plants/ha). These plants remained vigorous, however, no seedlings or young plants were sampled. The average bitterbrush height and crown measurements increased 54 inches (137 cm) and 74 inches (188 cm), respectively. The trend for grass is up. Although bulbous bluegrass continued to dominate the site, it seemed that this species was outcompeting cheatgrass. Cheatgrass was not sampled in 2007. There were also significant increases in the nested frequencies of intermediate wheatgrass and orchardgrass (*Dactylis glomerata*), both of which are perennials. The trend for forbs is slightly up. Although the site was still dominated by weeds, these species decreased from composing 97% of the forb cover in 2002 to composing 74% in 2007. Of the three noxious weed species, toadflax was the only species that statistically increased between 2002 and 2007. Bindweed significantly decreased, and whitetop was not sampled. The DCI rating improved slightly to poor due to an increase in browse and desirable perennial grass cover, and a decrease in the number of noxious weeds sampled.

winter range condition (DCI) - poor (23) Low potential scale
browse - stable (0) grass - up (+2) forb - slightly up (+1)

HERBACEOUS TRENDS --
Management unit 18A, Study no: 31

Type	Species	Nested Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
G	Agropyron intermedium	-	a79	b157	-	3.49	5.76
G	Bromus japonicus (a)	-	9	-	-	.01	-
G	Bromus tectorum (a)	a245	a254	-	3.02	1.90	-
G	Dactylis glomerata	-	a4	b32	-	.15	.56
G	Poa bulbosa	a178	b433	b415	5.99	25.93	16.12
G	Poa pratensis	-	3	-	-	.15	-
G	Poa secunda	-	14	-	-	.05	-
Total for Annual Grasses		245	263	0	3.02	1.91	0
Total for Perennial Grasses		178	533	604	5.99	29.78	22.45
Total for Grasses		423	796	604	9.02	31.70	22.45
F	Alyssum alyssoides (a)	-	23	-	-	.07	-
F	Ambrosia psilostachya	a33	c172	b132	1.09	3.11	1.87
F	Apocynum cannabinum	-	a92	b206	-	3.20	5.94
F	Arabis sp.	-	-	7	-	-	.01
F	Asclepias sp.	a50	-	b95	2.62	-	4.20
F	Aster sp.	a4	a3	b129	.15	.00	.91
F	Astragalus sp.	a2	-	a2	.01	-	.03
F	Cardaria draba	b63	a33	-	.93	.60	-
F	Camelina microcarpa (a)	a1	a2	a1	.00	.00	.00
F	Convolvulus arvensis	ab287	b326	a247	11.16	13.76	5.92
F	Comandra pallida	a3	-	a12	.00	-	.07
F	Collinsia parviflora (a)	a1	b41	a3	.00	.13	.00
F	Draba sp. (a)	a4	a9	a3	.01	.01	.01
F	Epilobium brachycarpum (a)	a93	a75	b162	1.74	.15	1.21
F	Eriogonum brevicaule	-	10	-	-	.01	-
F	Gilia sp. (a)	-	a1	a2	-	.00	.00
F	Grindelia squarrosa	a104	a117	a129	1.48	1.07	3.29
F	Helianthus annuus (a)	c211	b31	a1	5.36	.07	.03
F	Lactuca serriola	b115	-	a3	1.89	-	.00
F	Linaria dalmatica	a52	b113	c277	2.96	6.12	10.41
F	Linum lewisii	26	-	-	.15	-	-
F	Lithospermum ruderale	-	-	1	-	-	.03
F	Onobrychis viciaefolia	-	a2	a3	-	.00	.15
F	Phlox longifolia	-	29	-	-	.11	-

Type	Species	Nested Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
F	Polygonum douglasii (a)	$_{a}$26	$_{a}$21	$_{b}$94	.17	.06	.73
F	Sanguisorba minor	$_{a}$1	$_{a}$7	$_{a}$18	.00	.18	.19
F	Tragopogon dubius	-	$_{a}$16	$_{b}$60	-	.16	.57
F	Veronica biloba (a)	$_{a}$15	-	$_{b}$61	.07	-	1.36
F	Verbascum blattaria	$_{a}$20	$_{b}$84	-	.50	3.70	-
Total for Annual Forbs		351	203	327	7.37	0.50	3.36
Total for Perennial Forbs		760	1004	1321	22.98	32.06	33.65
Total for Forbs		1111	1207	1648	30.36	32.57	37.02

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 18A, Study no: 31

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Purshia tridentata	0	4	5	-	.18	2.88
Total for Browse		0	4	5	0	0.17	2.88

CANOPY COVER, LINE INTERCEPT --
Management unit 18A, Study no: 31

Species	Percent Cover	
	'02	'07
Purshia tridentata	-	5.80

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 18A, Study no: 31

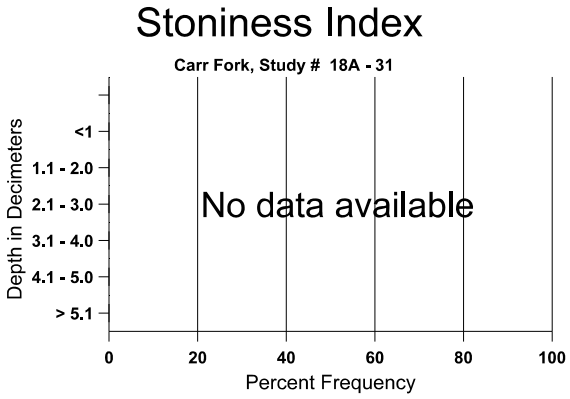
Species	Average leader growth (in)	
	'02	'07
Purshia tridentata	3.4	10

BASIC COVER --
Management unit 18A, Study no: 31

Cover Type	Average Cover %		
	'97	'02	'07
Vegetation	44.43	68.05	55.23
Rock	.78	.56	.16
Pavement	1.79	2.04	.91
Litter	18.82	37.32	36.50
Cryptogams	.16	4.01	6.65
Bare Ground	40.18	6.32	4.61

SOIL ANALYSIS DATA --
Herd Unit 18A, Study no: 31, Carr Fork

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
12.1	58.4 (12.7)	5.5	32.0	41.4	26.6	2.2	51.0	275.2	.4



PELLET GROUP DATA --
Management unit 18A, Study no: 31

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	-	-	1
Elk	-	-	1
Deer	2	7	19

Days use per acre (ha)	
'02	'07
-	-
-	
24 (60)	51 (126)

BROWSE CHARACTERISTICS --
Management unit 18A, Study no: 31

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus albicaulis												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	23/61
Purshia tridentata												
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**80**	-	-	80	-	-	50	50	-	-	0	15/28
07	**100**	-	-	100	-	-	0	0	-	-	0	69/102